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The Risk of Novel Coronavirus Infection among Healthcare Workers in a Therapeutic Center in Ardabil County, Northwest of Iran: A Descriptive Cross-Sectional Study (2021)

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Abstract

Background: Coronaviruses (CoVs) belong to the family Coronaviridae, the order Nidovirales, and the genus Coronavirus. This research aimed to assess the risk of infection with SARS-CoV-2 (COVID-19) among healthcare workers at Imam Khomeini Hospital, Ardabil County, Northwest of Iran.

Materials and Methods: In this descriptive cross-sectional study, 201 health care workers of Imam Khomeini hospital were recruited. The questionnaire included demographic information (including age, gender, height, and weight items) and information about job and working conditions, the degree of exposure to people suspected of having the disease, and the degree of compliance with health protocols.

Results: The mean age of the healthcare workers (HCWs) was 34.37 ± 7.42 years. In terms of job distribution, most of the HCWs were nurses (57.2%), and only 4.5% were experts. Regarding blood groups, most of the HCWs had the O+ blood group (35.3%). Besides, the PCR results showed that 85.1% of the HCWs had a positive PCR result, and 14.9% were negative.

Conclusion: In general, nurses were the most at-risk group among HCWs. This is because they were more frequently in direct contact with patients than other staff members.

Keywords: Health Care Workers, Coronaviruses, Hospital, Nurses.

Introduction

Today, the severe acute respiratory syndrome coronavirus (SARS-COV-2), which causes COVID-19, has turned into a global concern [1, 2]. The disease appeared in China and spread to other countries, which turned into a pandemic. Until now (11 November 2021), COVID-19 has infected 250.6 million individuals and killed 5.07 million persons worldwide. In Iran, 5.99 million persons have been infected with it, and 127.299 persons have died from COVID-19 [3]. In fact, this outbreak has been existing since the beginning of the pandemic in all countries, even in those with ideal health and political conditions [4, 5]. This virus enters cells inside the lungs, including pneumocytes, and uses them as the main sites of inflammation [6, 7]. The main symptoms of COVID-19 have been reported to be fever, dry cough, shortness of breath, nausea, vomiting, abdominal discomfort, and diarrhea, not being very typical in this disease [8-10]. Few studies have shown that COVID-19 can transmit from one human to another

through respiratory fomites, coughs, or sneezing [11-13]. In addition, some studies have reported airborne transmission of the disease, yet it has not been proved [14, 15].

The incubation period of COVID-19 is from 2 to 10 days, with the major way of transmitting this virus being person-to-person contact [16-18]. Now, using effective vaccines, upon acceleration of vaccine approvals, and through speedy distribution of vaccines, diagnosing the disease takes a shorter time. Besides, long-term outcomes have not been identified [19]. However, it should be mentioned that despite progresses made in the vaccination process, there is still no effective medicine and treatment identified for this disease. Thus, it is crucial for individuals to follow health instructions [20]. HCWs are at a high risk of infection with COVID-19 [21, 22]. Nurses are among the largest care communities during the outbreak of infectious diseases, being at the forefront of patient care. Thus, they are faced with the highest risk of death [23]. Besides, since HCWs and nurses are more exposed to the virus, they can carry and transfer it to the family and coworkers, or both [24, 25]. Herron et al (2020) conducted a study to investigate the use of protective equipment and its correlation with the risk of COVID-19 contraction. Accordingly, the test results of 10.627 healthcare workers in Italy were positive, and 34 of them died, indicating a mortality rate of 0.3%. Besides, they stated that the Italian officials announced the mortality rate was higher, which was not accurately notified due to some restrictions. According to the results of this study, the most worrisome statistic was the increase in the number of deaths among the healthcare professionals [26].

Since the data on the infection risk among healthcare workers are limited, and healthcare workers are at the forefront of the fight against COVID-19, there is an urgent need for new studies to be conducted on this disease [1]. Accordingly, this research was conducted to assess the risk of infection with SARS-CoV-2 (COVID-19) among HCWs at Imam Khomeini Hospital in the Ardabil County. Against this backdrop, health conditions of all employees, including specialists, experts, nurses, and service personnel are examined in this study.

Materials and Methods

In this descriptive cross-sectional study, the target community included the HCWs of Imam Khomeini Hospital in the Ardabil County. Accordingly, it was conducted in 2021 in Imam Khomeini Hospital in the Ardabil County. Given that Imam Khomeini Hospital is one of the major hospitals in the Ardabil County for hospitalizing COVID-19 patients, the treatment staff of this hospital were examined in the present study. This study is extracted from the research project approved by the Student Research Committee, School of Public Health, Ardabil University of Medical Sciences, Ardabil, Iran (IR.ARUMS.REC.1399.353).

The statistical population of this study included healthcare workers of Imam Khomeini Hospital in the Ardabil County. To this end, we used questionnaires that included demographic information on variables, such as age, gender, clinical symptoms, underlying diseases, types of drugs used, smoking, occupation, hours of work, number of daily clients, use of masks or shields, types of working hours, weight, height, body mass index, number of family members, place of residence, persons' role in the family, presence of an infected person in the family, communication with the person suspicious of the disease, and observance or non-observance of health protocols.

After completing the relevant information, the data were sorted by statistical analysis in SPSS V.20.0, with their significance or non-significance determined. A p-value > 0.05 was considered statistically significant. In case of any problems in some parts of the questionnaire, such as being empty or illegible, the patient would be contacted to complete the relevant parts by observing ethical protocols. The inclusion criteria were giving consent to participation in the study and definitive diagnosis of COVID-19 based on the CT scan or a PCR test for 201 staff members of the mentioned hospital. The exclusion criteria included incorrect or incomplete registration of the HCWs' information in the system, patients hospitalized for reasons other than COVID-19, and HCWs who, at the time of admission, stated they would not like their data to be used. To estimate crude odds ratios and adjusted ones, univariate and multiple logistic regression models were used, respectively. Besides, the Hosmer-Lemeshow guideline was used to select variables in a multiple model.

Results

The results showed that the mean age of the HCWs was 34.37, with a standard deviation of 7.42 years. Besides, 145 (72.1%) HCWs were female, and 56 (27.9%) were male. In this study, only 1.5% of the HCWs had a smoking history. In terms of job distribution, most of the HCWs were nurses (57.2%), and only 4.5% were hospital experts. Regarding the blood group, most of the

HCWs had an O+ blood group (35.3%). The following table shows the HCWs' demographic distribution (Table 1). Data analysis results showed that from all HCWs at the risk of COVID-19, 115 (57.2%) were nurses, and only 9 (4.5%) were hospital experts (Table 1). In terms of the certainty of the disease, the PCR test results showed that the disease was confirmed in 171 (85.1%) HCWs (Table 2).

Table 1. Frequency data of HCWs at Imam Khomeini Hospital, Ardabil County

Variable		Frequency N(%)	Variable		Frequency N(%)
Gender	**Man**	56 (27.9)	**Education**	**High school diploma and lower**	43 (21.4)
	Female	145 (72.1)		**Bachelor's degree and higher**	158 (78.6)
Shift work	**Fixed**	46 (22.9)	**PCR results**	**Positive**	171 (85.1)
	Rotating shift	155 (77.1)		**Negative**	30 (14.9)
Job type	**Hospital employees**	30 (14.9)	**Blood group type**	**A+**	54 (26.9)
				A-	6 (3.0)
	Hospital experts	9 (4.5)		**B+**	33 (16.4)
				B-	12 (6.0)
	Nurses	115 (57.2)		**AB+**	19 (9.5)
	Active nurses	25 (12.4)		**O+**	71 (35.3)
	Service personnel	22 (10.9)		**O-**	6 (3.0)

Table 2 shows distribution of the factors associated with COVID-19 among the HCWs infected with COVID-19 at Imam Khomeini Hospital, Ardabil County.

Besides, Table 2 shows the results of underlying diseases and symptoms of the disease in the HCWs infected with COVID-19 at Imam Khomeini Hospital, Ardabil County. According to the results, only 23.4% of the the HCWs had underlying diseases, yet 76.6% did not have any underlying diseases (Table 2). In addition, 91% of the HCWs had symptoms of the disease.

Table 2 shows CT scan results of the HCWs infected with COVID-19 at Imam Khomeini Hospital, Ardabil County. According to the results, only 51.7% of the CT scan tests of the infected HCWs were positive (Table 2).

The following table shows the effect of various factors on the result of the PCR test being positive.

Table 2. Distribution of factors associated with Covid-19 disease among HCWs infected with COVID-19 at Imam Khomeini Hospital, Ardabil County

Variable		Frequency N (%)	Variable		Frequency N(%)
Having an underlying disease	Yes	47 (23.4)	**CT scan result**	**Positive**	104 (42.8)
	No	154 (76.6)		**Negative**	86 (51.7)
Symptoms of the disease	Yes	183 (91)		**Suspicious**	11 (5.5)
	No	18 (9)			

Discussion

The world was taken by surprise by the acute respiratory syndrome coronavirus 2 and the disease in December 2019 [27]. The new variants have appeared, which are more powerful, with their transmission rate being by 70% higher in some variants than in other strains [28]. Besides, given that nurses and HCWs are at the forefront of healthcare and social care systems (29), and considering that other studies indicate that HCWs are at a high risk of COVID-19 contraction [30], we easily feel the need for more studies of this kind. Unfortunately, in some countries like Italy, HCWs have experienced high rates of COVID-19 contraction and death [31]. The prevalence of COVID-19 depends on many factors. For example, some studies show that its prevalence has a high correlation with the availability of personal protective equipment (PPE), access to testing facilities, and the type of the healthcare system [27, 32]. However, the infection rate is at an all-time high level in certain countries because of the

COVID-19 pandemic. As a result, senior HCWs, especially doctors and nurses, have been forced to join the frontline workers, and some of them have been back from retirement to provide leadership, experience, and expertise to other professionals so as to raise their morale. Health disorders and risk factors related to COVID-19 include high blood pressure, immunosuppression, chronic lung diseases, diabetes mellitus, and old age, whose effects have been significant [33, 34]. According to our results, about 23.4% of the HCWs had an underlying disease that could be effective in making them vulnerable to COVID-19. Given the high prevalence of COVID-19 contraction among the HCWs, they should use some simple methods, like practicing hand hygiene and social distancing, during their work shifts (rotating and non-rotating) to better take care of themselves and the community [35]. According to our results, among all HCWs, nurses were the most at-risk group, which could be due to their face-to-face interaction with patients. In addition, based on the frequency and percentage of COVID-19 patients in the present study and other similar studies [1], the number of the infected people (relative to the population) was more in nurses than in other healthcare workers. Yuanyuan et al (2020) reported that many factors, such as long working hours increased stress and anxiety among nurses, which predisposed them to a high infection risk [36]. Our results showed that the CT scan test could not be very reliable, for the infection was diagnosed by the CT scan test only in 51.7% of the infected HCWs. In a study by Poortahmasebi et al (2020), they suggested that the CT scan should be used for symptomatic and hospitalized patients, not as a primary screening tool for diagnosing COVID-19 [37]. In the case of the PCR test, our data showed that the accuracy of this test was 85.1%, having been helpful for COVID-19 screening. However, in the study by Long et al (2020), different results were obtained so that they reported PCR tests could produce false negative results [38]. Our data analysis showed that only 23.4% of the HCWs had underlying diseases, with most of the diseases having been diabetes and asthma. This was because asthma has a very close connection with the respiratory system, so this underlying disease could be detected among HCWs. Besides, many studies showed that diabetes is one of the most dangerous underlying diseases for COVID-19. Regarding blood groups, most of the HCWs had the O+ blood group (35.3%), which indicated two different facts. Firstly, the majority of the HCWs had this type of blood group, and secondly, the O+ blood group was the most at-risk blood group in the case of COVID-19 contraction. This finding was consistent with those of the study by Sarailoo et al. In the study by Sarailoo et al, people of different occupations in the community were examined. Accordingly, the results showed that the highest probability of COVID-19 contraction in the people of the community was related to positive blood groups O+ and A+ [30]. We suggest that HCWs have a fixed work location at a medical center. In this regard, the study by McMichael et al reported that the temporal and geographical transmission of the disease was partially due to the movement of HCWs from one facility to another [39]. One way to reduce the mortality rate among healthcare workers is to involve people over the age of 50 in administrative capacities rather than in direct patient care activities [40, 41].

Conclusion

Unfortunately, the prevalence of positive COVID-19 among HCWs is on the rise day by day all over the world. Hence, health systems should take an efficient decision on taking care of HCWs and providing them with high quality PPE by taking into consideration the results of the present study, including reliability of the CT scan and PCR tests. We also suggest that to accurately monitor the infection of HCWs with COVID-19, PCR tests be used more than CT scans. Besides, underlying diseases are not very effective in COVID-19 contraction. However, for HCWs with underlying diseases, it is better to change their type of tasks. This study can be used as a reference for research on COVID-19 in HCWs.

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Conflict of interest: None declared.

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